

**TRANSLATION**

**PATENT COOPERATION TREATY**

**PCT**

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>8602 WO RO-HA</b>	<b>FOR FURTHER ACTION</b>	See Form PCT/IPEA/416
International application No. <b>PCT/EP2004/010295</b>	International filing date ( <i>day/month/year</i> ) <b>15.09.2004</b>	Priority date ( <i>day/month/year</i> ) <b>13.10.2003</b>
International Patent Classification (IPC) or national classification and IPC <b>G01L3/10</b>		
Applicant <b>ZF FRIEDRICHSHAFEN AG</b>		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of <u>10</u> sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising: a. <input checked="" type="checkbox"/> ( <i>sent to the applicant and to the International Bureau</i> ) a total of <u>3</u> sheets, as follows: <input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input checked="" type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> ( <i>sent to the International Bureau only</i> ) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items: <input checked="" type="checkbox"/> Box No. I Basis of the report <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input checked="" type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input type="checkbox"/> Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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## Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-10 \_\_\_\_\_ as originally filed/furnished
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☒ the claims:
- nos. \_\_\_\_\_ as originally filed/furnished
- nos.\* \_\_\_\_\_ as amended (together with any statement) under Article 19
- nos.\* 1-7 \_\_\_\_\_ received by this Authority on /filed with the demand
- nos.\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☒ the drawings:
- sheets 1/2, 2/2 \_\_\_\_\_ as originally filed/furnished
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_
4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages \_\_\_\_\_
- ☒ the claims, nos. 1, 4 \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. IV

Lack of unity of invention

1. ☐ In response to the invitation to restrict or pay additional fees the applicant has:
- ☐ restricted the claims.
  - ☐ paid additional fees.
  - ☐ paid additional fees under protest.
  - ☐ neither restricted the claims nor paid additional fees.
2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is:
- ☐ complied with.
  - ☒ not complied with for the following reasons:

**See Supplemental Box**

4. Consequently, this report has been established in respect of the following parts of the international application:

☒ all parts.☐ the parts relating to claims Nos. \_\_\_\_\_

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
<b>1. Statement</b>			
Novelty (N)	Claims	<u>1-7</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-7</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-7</u>	YES
	Claims		NO
<b>2. Citations and explanations (Rule 70.7)</b>			
1.	<p>Document D1 discloses (the references between parentheses refer to that document): a method for determining the torque on gear shafts, the speed of a first gear shaft (16) and the speed of a second gear shaft (90) being cyclically measured at a constant gear ratio, the first gear shaft (16) being subject to a first torque and the second gear shaft (90) being subject to a second torque and the second gear shaft (90) being directly or indirectly driven by the first gear shaft (16) via gears, a difference in speed being calculated from the two speeds and then being stored.</p>		
2.	<p>The subject matter of claim 1 thus differs from the known method in that the two speeds are used to calculate a quotient, which is then stored, in that the actual quotient is compared with the quotient from a previous measurement and that when the quotient from the actual measurement and the quotient from a previous measurement differ it is concluded that the torque on the first gear shaft has changed, in that the speeds of the two gear</p>		

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
	<p>shafts are determined using speed sensors which generate electrical pulses according to the speed, in that the measured electrical pulses from the speed sensors on the two gear shafts are used to determine a phase displacement or an angular displacement of the pulses which is proportional to the transmitted torque and to the elasticity of the gear components which transmit the torque and which is evaluated as a characterising variable for the input torque. The current invention can therefore be considered to address the problem of reducing errors in determining torque which are caused by errors in the speed sensors that generate the electrical pulses according to the speed. This combination of features is neither disclosed nor suggested by the available prior art. The solution proposed is therefore inventive. Claim 1 and dependent claims 2, 3 and 5 to 7 thus meet the requirements of PCT Article 33(2) and (3).</p> <p>3. The subject matter of claim 4 thus differs from the known method in that the two speeds are used to calculate a quotient, which is then stored, in that the actual quotient is compared with the quotient from a previous measurement and that when the quotient from the actual measurement and the quotient from a previous measurement differ it is concluded that the torque on the first gear shaft has changed, in that the speeds of the two gear shafts are determined using speed sensors which generate electrical pulses according to the speed,</p>

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
	<p>in that the speeds from two gear shafts that are associated with a retarder are measured and in that the braking torque of a retarder is determined. The current invention can therefore be considered to address the problem of improving the regulation of the braking action of the retarder. This combination of features is neither disclosed nor suggested by the available prior art. The solution proposed is therefore inventive. Claim 4 and dependent claims 5 to 7 thus meet the requirements of PCT Article 33(2) and (3).</p>

## Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

**Box I****Basis of the report**

The applicant has replaced the word "quotient" in claims 1 and 4 with the word "value". There is no basis in the original disclosure for this generalisation, and therefore the replacement introduces substantive matter which goes beyond the application as originally filed. The application thus contravenes PCT Article 19(2). This report therefore assumes that the word "value" has been replaced by the word "quotient".

**Box IV****Lack of unity of invention**

1. Reference is made to the following document:

D1: US-A-5 729 454 (AMSALLEN MARCEL)  
17 March 1998 (1998-03-17)

2. Document D1 is considered the closest prior art and discloses (the references between parentheses refer to that document): a method for determining the torque on gear shafts, the speed of a first gear shaft (16) and the speed of a second gear shaft (90) being cyclically measured at a constant gear ratio, the first gear shaft (16) being subject to a first torque and the second gear

## Supplemental Box

shaft (90) being subject to a second torque and the second gear shaft (90) being directly or indirectly driven by the first gear shaft (16) via gears, a difference in speed being calculated from the two speeds and then being stored.

Thus in document D1 the rate of change of the difference in speed is calculated and the change in torque determined therefrom.

A person skilled in the art knows that in order to calculate the rate of change of the difference in speed in a computer, the actual difference must be compared with the difference from a previous measurement, and therefore this feature is implicitly disclosed in document D1.

The subject matter of claims 1 and 4 thus differs from the known method in that the rate of change of the speed quotient and not the rate of change of the difference in speed is calculated. A person skilled in the art is, however, generally aware that the rate of change of the speed quotient is equivalent to the rate of change of the difference in speed known from document D1 for determining torque elasticity and that the two can be used interchangeably without an inventive step (PCT Article 33(3)) needing to be exercised.

The feature according to which "the speeds of the two gear shafts are determined using speed sensors, which generate electrical pulses



## Supplemental Box

according to the speed" is only one of several obvious possibilities from which a person skilled in the art would choose according to the circumstances in order to solve the problem of interest, without thereby being inventive.

3. The subject matter of claim 1 differs from the above in that on both gear shafts a phase displacement or angular displacement of the pulses is determined, said displacement being proportional to the transmitted torque and to the elasticity of the gear components which transmit the torque, and being evaluated as a characterising variable for the input torque.

The subject matter of claim 4 differs from the above in that the speeds of two gear shafts which are associated with a retarder are measured and in that the braking torque of a retarder is determined.

Since the above groups of invention do not match, the inventions are not defined by the same special technical features.

4. The inventions are also not defined by corresponding special technical features for the following reasons:

Problem 1: claim 1: errors in determining torque as a result of errors in the speed sensors

## Supplemental Box

Problem 2: claim 4: difficulties in regulating the braking action of the retarder

Since the features solve completely different problems, the inventions are also not defined by common corresponding special technical features.

5. Consequently, the application does not contain any of the same or corresponding special technical features which could be used to establish a common inventive concept, and therefore the link required by PCT Rule 13.1 and 13.2 is not established.